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# HAECKEL, A COLOSSUS OF SCIENCE.

BY HERMAN SCHEFFAUER.

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THE last Olympian figure of the science of evolution in the nineteenth century is that of the venerable, resolute and optimistic Ernst Haeckel. Like a Titan who has laid aside his arms and implements and composed himself to rest after a laborious and stormy life, he sits throned upon a mountain of masterly accomplishment and looks with a smile upon the new days in which the harvests of his thought are growing. This silver-haired, blue-eyed Luther of Science, gifted with the spirit of perennial youth, is the last of a small but mighty band. Darwin, Huxley and Spencer were the other great and contemporaneous lights of this system of suns. But as the most modern and the most active of them all, he may be said to embody in himself and his labors the latest expression of the theory of evolution.

The history of Haeckel's enormous achievements and his inspiring life forms one of the most stirring epics of human activities; the real significance of his herculean tasks and investigations still lies beyond conjecture in the summary of thought and culture. Few men, indeed, have so completely rounded out their purposes and plans, few have brought to so honorable and lofty a close the endeavors, ambitions and aspirations of their lives. About this vital and puissant personality of Haeckel, so warmly touched with all that is sweet, affable and human, so in contrast with the cold formalism of science, the dust-clouds of embittered contention have scarcely yet been laid. Fierce and persistent antagonism has been his, not so much because of the destructive tendency of his teachings as of that which was constructive. His teaching is not only the foe of the ancient and moribund creeds, but also their competitor. It has been bitterly resented that this master biologist, with his poetic imagination and salient impulse

towards philosophy, should have dared to venture beyond the boundaries of his particular branch of science to build up a creed or system of ethics for the modern man out of the facts of his investigations and the deductions of his vast research. It was not granted him to apply the truths he discovered to human life nor to shape a religion from them. Yet it is this very audacity that has given to him the glamour and the prestige he now enjoys, for he has been able to fire the imaginations of mankind in a measure hitherto attained by few men of science. Fearless, militant and exuberant crusader for truth, he has built himself a monument in the heads and hearts of humanity and has realized immortality while still living.

Born at Potsdam in 1834, he grew into a joyous child with large blue eyes and blond ringlets, and something of this ingenuous beauty and radiance of happiness has clung to the scientist through all his years. His first bent was towards botany, and for his encouragement in this he has remained eternally grateful to his mother, as witness this dedication of his "Indian Travel Letters" to her in her eighty-fourth year:

"It wast thou who from my earliest childhood didst nurture and perfect in me a feeling for the unending beauties of Nature. When I was a growing youth thou didst teach me in good time the value of the hours and the joy of work. Thou hast guided my various and changing destinies with all the inexhaustible care and devotion which find their expression only in that single word—Mother-love."

While the youthful Haeckel went botanizing beautifully through the fields, his awakened soul agitating itself with tremendous questions, the colossal intellect of Darwin was striving with its deep problems at his quiet Kentish home. Goethe had exercised a powerful influence upon the phantasy of Haeckel, and by degrees the crystalline conception of the cosmos held by the majestic poet began to dominate his thought. He began to seek God in the Nature about him. Humboldt's "Aspects of Nature," Schleiden's "Plants and Their Life" and Darwin's "Travels of a Scientist around the World" were three other works that formed and influenced him. Then, under the guidance of the famous Alexander Braun, the young and ambitious student made amazing progress in botany. But now entered the factor of parental authority with the command: "First choose a profession that will bring you bread before you take up with profitless hobbies!"

The profession of medicine was determined upon — medicine, through whose channels Haeckel was to be led from botany unto zoology. After three semesters at Würzburg he withdrew to Berlin and came under the potent influence of the great Johannes Müller, the magic of whose presence and personality was said to be irresistible. Under Müller he made a study of comparative anatomy. A splendid friendship sprang up between the master and his pupil, and in the fierce intensity of his studies Haeckel began to lose sight of the professional career in medicine to which his father hoped to see him devote himself. But at the request of the elder Haeckel he went back to the University of Würzburg for three further semesters. Here he became the pupil and later the assistant of the famous Rudolf Virchow, between whom and Haeckel there was to result in after years an unrelenting scientific antagonism.

“In three semesters,” says Haeckel, “Virchow taught me the art of the most delicate analytical observation. But that which inspired me most during these days at Würzburg was Virchow’s wide, prophetic insight and his deep philosophic and scientific ideas.”

At last, to appease his father, young Haeckel settled down to the practice of medicine. It is with delicious irony that he tells of the three patients that sought his services, one with a sprained finger, another with a broken rib, the third with a slight fever. So that his time might be all his own for his passionate studying, Dr. Haeckel set his office hours between five and six in the morning! At last the stern father relented and permitted his son to sally forth to the Mediterranean to pursue his investigations. Full of the joy of life, and burning with a scientific ardor comparable only to that of a great creative artist, he roved through Italy, firmly set upon that road he was henceforth to follow to his vast ultimate renown.

While he was toiling beside the Strait of Messina, discovering new species of *Radiolaria*, that epochal work of Darwin’s, “The Origin of Species,” was quietly launched in London. Its effect upon Haeckel was overpowering. New beauties, truths and revelations burst upon him; the last shreds of doubt and the last fetters of superstition fell from him and life and the universe expanded before his vision as in an apotheosis. But the restless spirit of the young German could not confine itself to the narrow, purely

scientific limits imposed upon the theory of evolution by the conservative, unimaginative Darwin, still fearful of the thunders of aggressive orthodox theology. Haeckel's vision darted beyond that of the great Englishman and beheld in the portentous discovery—to use the words of one of his biographers, Dr. Otto Gramzow—"the germ of a new conception of the universe." And in the expansion and generalization of this idea lay all the subsequent strength and weakness of his philosophy. His impatience with capitulations to orthodoxy at once betrays itself:

"If Darwin still assumes a special act of creation for the primal species, I hold this to be inconsequential, and as it appears to me, not meant seriously. But entirely apart from this and other shortcomings, Darwin's theory has even now rendered the immortal service of having brought meaning and intelligence into the whole scheme of the relation of species."

In 1861, behold Haeckel as "privat-dozent" at Jena—the stronghold of the metaphysics of Hegel and the idealism of Schiller! In the following year, he was established in the chair of zoology at the university and married to his cousin, Anna Sethe. Then, in 1863, amid laughter, jeers and ridicule, he raised the banner of evolution in the face of all the assembled scientists of Germany at a congress in Stettin and closed his defiant utterance thus:

"These attacks will never stem Progress. For Progress is one of Nature's laws, which no human force, neither the arms of tyrants nor the curses of theology, can ever permanently crush."

Hostile camps formed themselves to wage war against the new idea, and at their head stood the imposing and dignified figure of Virchow. Haeckel calmly withdrew to his peaceful Jena to forge new weapons, and here, in 1864, Fate dealt him a terrible blow in the loss of his beloved wife. Driven almost to despair and threatened with a devastating melancholia, he sought to master his sorrow by plunging headlong into the stupendous labors that gave to the world his monumental work on "General Morphology." Three or four hours' sleep was all he allowed himself, and when the work was completed he lay exhausted. Then followed a brief visit to Darwin at Down, in Kent. Haeckel's words upon this meeting are interesting:

"As the coach stopped before the cheerful, ivy-covered country house, shaded by fine elms, I saw the great investigator coming towards me.

He stepped from out the shadow of the vine-mantled porch—a tall, venerable figure, with the bowed shoulders of an Atlas, carrying a world of thought, a Jovean brow like that of Goethe, lofty and broadly vaulted, furrowed deep by the plough of intellectual toil, soft, kindly eyes overshadowed by a heavy pent-house roof of beetling brows, and a sensitive mouth framed by an opulent, silver-white beard. The hearty, captivating expression of the whole face, the sweet, soft voice, the slow, thoughtful utterance, the natural and naïf succession of ideas in his conversation, took my whole heart by storm, just as his great masterpiece had before seized upon my whole intellect. It seemed to me that I stood in the living presence of some exalted cosmic sage, some Socrates or Aristotle."

Darwin confessed his adherence to the views of Haeckel, yet the conservatism of the older man acted at times as a restraint upon his zealous disciple. Then came Haeckel's journey to the Canary Islands, originally for recuperation, yet resulting in many fertile labors. Indefatigable, constant work, book after book given to the world, thousands of scholars following the growing light of his fame and crowding his classes, his whole effort bent upon diffusing the knowledge he gathered with such pains and precision—these things now filled Ernst Haeckel's life year after year.

In 1877 came the famous clash with Virchow, brought about by Haeckel's advocating the teaching of evolution in the common schools in his lecture at Munich, "The Present Study of Evolution in its Relation to General Knowledge." Virchow in a strangely reactionary spirit and malevolent manner attacked his former pupil in a discourse entitled, "Concerning the Freedom of Science in Modern Government." He denounced Darwinism as socialistic and called for strenuous opposition to it. Haeckel, in a brilliant and masterly brochure, "Free Science and Free Instruction," gave a triumphant answer to his former teacher. Even the gentle Darwin was moved to write his friend:

"Virchow's conduct is shameful, and I hope he will some day feel the shame."

Haeckel's attitude of challenge towards all that would impede him in his fearless search for truth marshalled many enemies against him. One distinguished theologian sought to cut short his professorial career by direct appeal to the old Archduke Karl Alexander, a veteran of the great days of Weimar, who had been face to face with Goethe.

"Do you think that this man really believes the things he teaches?" the Archduke asked the minister.

"Yes, that is just the trouble—I'm sure he does."

"Well, then, he is merely doing the very same thing as yourself," remarked the Archduke, dryly, and the audience was closed.

Tempting offers, with royal salaries attached, were made to Professor Haeckel to occupy the chairs of zoology and biology at the great English and American universities, but in vain, for nothing would induce him to leave his ancient and beloved Jena, that fortress of intellectual strength and liberty. Over forty eminent scientific works now stood to his credit, as well as innumerable medals, diplomas and titles, for every year brought fresh honors.

Nevertheless, it was only with the publication of his great "Riddle of the Universe" in 1899, followed by "The Wonders of Life" in 1904, that the arrows of his thought and aspiration found their marks in the minds of mankind at large. The colossal success of the controversial "Riddle" was something unparalleled in the history of works of science. It popularized and made plain the natural philosophy and religion of Haeckel's Monism to minds that had hitherto remained untouched by a single ray of the serene light of modern investigation. This work has been translated into over a score of languages, and its readers, from the humblest to the most cultured, almost equal in number those of the Bible. Whirlwinds of passionate attack and defence followed upon the rapid editions of the book, which, imperfect sketch that the master proclaimed it, was nevertheless seized upon, not as propounding, but as dogmatically answering those tremendous enigmas before which man has stood silent and aghast since the dawn of time. To many it seemed heresy that a scientist should dare utter a philosophy of religious ethics or hypotheses that were but daring conjectures. With these two works, Haeckel sought to write *his* under the enormous labors of his lifetime, sought to cap the apex of his achievements with this brilliant and final burst of his genius, a climax that presented with all the remarkable vision and absorbing romance of truth, the results of his ceaseless probing into the mysterious sources of existence. The magnificent accomplishment of the aged thinker was like the heroic charge of some youthful Titan upon the brazen heavens where the gods of old were throned. Its effect upon the public was one of mingled terror, amazement, furious resentment and wide-spread acclaim.

The great riddles which Haeckel propounds are four: Man,

Soul, World and God. It will prove luminous to seize briefly upon the essence of Haeckel's Monism, and his comprehensive conception of Substance and its all-pervading laws. It is on this point that the philosopher of Jena has been attacked as a gross materialist, a worm that preferred the dust, a being of the earth earthy, since the very term itself is fraught with a false and debasing significance. From Haeckel we must revert to Spinoza for the first lucid and unified modern conception of substance, for in his view, substance is the one recognizable expression of the cosmos. Substance manifests itself in the universe in the attributes of Thought and Extension. In the field of Thought we realize psychic phenomena; in the field of Extension, corporeality as individual manifestations or activities of substance. There is but one Substance, and Matter and Energy are its inseparable attributes. Two distinct scientific axioms support this inalienable truth. The first is the chemical law of the Conservation of Matter, discovered by Lavoisier in 1789: Matter can undergo no annihilation, but merely a manifold alteration. The second axiom is the co-related law of the Conservation of Energy, discovered by Robert Mayer in 1842, The Sum of all Active Energy in Space is Absolutely Constant. As matter is indestructible, so too is energy. When a force expends itself, it is merely converted into another force. Mechanics, heat, light, electricity, thought itself, as verified by the modern processes of mental healing and the many vague irregularities of "new thought," are all but forms or modifications of this original primal force.

Chemistry has made plausible the analogous hypothesis of an original or primal matter to which it has given the name of protyl. Therefore, if these laws apply to both the organic and the inorganic world all Being is merely a constant exchange of Force accompanied by a constant exchange of Matter. And since Force and Matter are but attributes of one and the same thing, the Law of Substance remains distinct as the one basic canon of the universe. It governs the unity of the world and against its everlasting immutability the fanciful structures of metaphysics crumble into a heap. Upon these simple, fundamental and incontrovertible truths of the Law of Substance the philosophy of Monism has been built up. It is incompatible with all ancient dualistic conceptions of Deity and the World, Spirit and Nature,



Force and Matter. It has placed the helm of human progress, thought and spiritual development in the hands of the greater natural philosophy as the power which is alone able to satisfy the demands of modern reason.

The Monism of to-day is, however, still an imperfect and incomplete system. There is still many a gap, and many an hiatus, and these the daring and speculative mind of Haeckel has ventured to bridge in anticipation. He guesses, undauntedly, at the solutions of the stupendous riddles, and stands inflexibly upon his basic fact of the divine all-inclusive nature of Substance—its immutability, its motion, its sentience and its innate will. As science pushed her bright ramparts farther and farther into the darkest fields of the unknown the enthusiastic Haeckel was ill content to remain passively sheltered behind the slowly growing mounds of facts, but leaped boldly into the breach and flung his trained imagination forward beyond the lines. Induction and deduction are his weapons, howsoever the shield of logic sometimes fails to cover him in the fields of what is still inscrutable. Yet even here his method must be held to be the only possible one through which the sphere of knowledge may be enlarged. For to him the “soul” is not a substance, but a phenomenon of Nature, and therefore psychology becomes inevitably a part of natural science, and its only possible and reasonable method of study naturally falls into the divisions of observation, experiment, evolution and philosophical speculation.

For Haeckel there can be no reconciliation between faith and knowledge, as in the grotesque and pathetic attempts of Sir Oliver Lodge;—for to him there is but one real source of truth and that is Nature. His method is entirely realistic and Aristotelian. The ethical and moral significance of the world-religion of Monism he bases upon the three inspiring ideals of the True, the Good and the Beautiful, deeming these sufficient for the most exalted life of man. In this he speaks again as Spinoza and Goethe spoke. He has even declared the establishment of a cultural Monistic Church to be one of the tasks of the twentieth century—“a church upon whose high altar the figure of Urania may be throned, symbolizing in the movements of the heavenly bodies, the almighty operation of the eternal Law of Substance.”

Serene, crowned with kingly honors and filled with a radiant optimism and a deep faith in humanity, this aged Homeric

thinker now lives in retirement at his handsome villa in idyllic Jena. To look into the mellow, clear blue eye, to listen to the buoyant and youthful enthusiasm of his speech or hear the wonderful crystalline laughter ringing from a heart of almost child-like innocence, are the more impressive as they stand in relation to the Titanic mind, energy and achievement represented by the famous evolutionist. His silver locks bared to the autumn sun, we walked together through the pretty streets of the picturesque Thuringian town, he chatting gayly and swinging his great pilgrim's hat of soft beaver—a peculiar headgear resembling the slouch hats of Bismarck. Some unknown admirer of the scientist sends him one of these costly hats every four months. Close to the Zoological Institute nestles a little garden above a brook which flows past Haeckel's study windows. Here we sat down before a massive stone table—the same at which Schiller wrote his “Wallenstein,” and Goethe drank his Rhenish wine in the fair old days. Later, as we strode through the charming public park called “Das Paradies,” or edged along the waterways of Jena's “Little Venice,” Haeckel, speaking happily as one speaks of his family or familiars, touched upon the diversified plant and animal life in air, earth and water. A sweep of his hand, a few words, and the beauty of the surrounding hills lay expressed in poetic phrases or their ancient secrets revealed in geologic terms.

In his study lie the monuments of his toil, arousing in the beholder an inevitable astonishment even at their physical magnitude. His more than fifty volumes were all written and copied by his own hand, the thousands of exact and delicate drawings in his works were all executed by himself, the endless specimens in his museum were gathered, mounted and labelled without the help of a single person other than his faithful old body-servant, Pohle. The artist soul in Haeckel often leaps to the fore both in pictorial and literary expression. His huge portfolios bulge with over a thousand landscape sketches in water-color, executed with a fine, free technique and splendid color sense—glimpses of Ceylon and India, Roman ruins, ice fields and bergs, Norwegian fjords, seascapes of Corsica, Java or Teneriffe, deserts of Africa and mountains of Malaysia—all these he laid before me with a joy beautiful to behold. He has brought new *motifs* and materials to the art-world in the shape of wonderful shells, ethereal forms and iridescent colorings of strange, graceful ani-

mals flower-like and translucent as spirits. Many artists, designers and architects have begun to make use of this fresh material as presented to them in his recent work, "Art-forms of Nature."

"Science shall give new life to all the arts," he said to me; "poetry itself shall find a new and noble inspiration here and grow greater since it will feed on greater truths."

On February 16th of last year, the occasion of his seventy-fifth birthday, Haeckel resigned his professorship at Jena. Great festivities were held in his honor, but contrary to his desire. The students gave a torchlight procession, the Kaiser, whom he had at times criticised, had conferred upon him the title of Excellency, State Councillor, and tributes, eulogies and gifts rained upon him from everywhere. He dedicated a splendid new building, the Museum of Evolution, as a gift to the University. It was built at his own expense and is the only institution of its kind in the world. The frescoes of its many rooms consist of vivid adaptations of wonderful deep-sea forms of life. Haeckel's entire time is now devoted to the installation of the countless exhibits, so that this monument may stand as the sum and symbol of the Evolution of to-day, as he himself may be said to be the greatest expression and exponent of the life philosophy he has built upon it.

HERMAN SCHEFFAUER.